

AMENDMENTS TO THE DRAWINGS:

An attached replacement drawing sheet(s) and an annotated sheet(s) showing changes to the drawings are attached to this Response as an Appendix. These replacement sheets comprise amendments to Figure 12. These amendments correct informalities related to objects to the specification as noted in the Office Action. The amendments to Figure 12 in combination with additional amendments to the specification set forth herein address the objections to the specifications set forth in the Office Action. Accordingly, Applicants respectfully request that all objections to the specification be withdrawn.

REMARKS

This paper is being provided in response to the Office Action dated July 14, 2006 for the above-referenced application. In this response, Applicant has amended Figure 12, the specification and Claims 1, 16, 36, 38, 39, 48, and 52-107 in order to clarify that which Applicant deems to be the claimed invention. Applicant respectfully submits that the amendments to the specification, figures and claims do not add new matter and that the foregoing amendments to the claims are supported by the originally filed application.

In response to the objections to the specification, Applicant has amended the specification in combination with amendments to Figure 12 in accordance with remarks set forth in the Office Action. In connection with the objections with respect to page 1, Applicant has amended the page to remove the requested portions. With respect to the objections regarding the equations at page 73, lines 10 and 22, Applicant has amended Figure 12 and also made amendments to the specification to address any inconsistencies between the Figure 12 and the specification in accordance with remarks set forth in the Office Action. With respect to the objections regarding pages 7 and 8, Applicant respectfully submits that the equations as set forth do not need further amendments with respect to Figure 12. Pages 7 and 8 are not included in the Description of Embodiments where reference is made with respect to the figures. Rather, pages 7 and 8 of the application are included in the Summary of the Invention section.

In view of the foregoing amendments and remarks, Applicant respectfully requests that the object be reconsidered and withdrawn.

In connection with numbered paragraph 4 on page 3 of the Office Action, Applicant is unclear as to the relevance of this paragraph. Paragraph 4 does not set forth a rejection but appears rather as a commentary. Paragraph 4 states that neural networks require training and without such training, the network is not capable of functioning. With respect to the foregoing as related to neural networks, it is known in the art that some form of training is needed. Neural networks and associated training are also discussed in numerous locations throughout Applicant's specification, for example, in Figure 13 and the specification at page 56, line 7-page 59, line 7, page 67, line 5-page 72, line 18. Paragraph 4 also states that: "Unless functional related values are input to the Kalman filter and such Kalman filter is appropriately derived, determination of weight cannot be made." Applicant is unclear what the foregoing citation in the Office Action is suggesting with respect to Claims 1-107 particularly since not all the claims recite a Kalman filter (see, for example, Claims 1-37).

The rejection of Claims 57-107 under 35 USC 101 as relating to non-statutory subject matter is hereby traversed and reconsideration thereof is respectfully requested. Applicant has amended Claims 57-107 to recite a computer readable medium. Applicant respectfully submits that Claim 57-107 are now directed to statutory subject matter. In view of the foregoing, Applicant respectfully requests that the rejection be reconsidered and withdrawn.

The rejection of Claim 16 and 72 under 35 USC 101 as lacking patentable utility is hereby traversed and reconsideration thereof is respectfully requested. Paragraph 6 of the Office Action appears to state that values used in the equations of the claims which cause the denominators included therein to evaluate to zero render the equations undefined, and thus, render the claimed invention as lacking patentable utility. Applicant has amended Claims 16 and

72 herein to exclude values causing the denominators of the equations for the corrected vertical acceleration, torque coefficient, advance ratio, and climb rate included therein to evaluate to zero. Applicant respectfully submits that the foregoing amendments to Claims 16 and 72 do not add new matter because one skilled in the art would interpret the equations as included in the specification to exclude such values based on well known algebraic rules for fractions known in the art. With respect to OAT as used in the density ratio, Applicant notes that OAT is defined and explicitly recited as “outside air temperature” in the claim. Applicant respectfully submits that an outside air temperature of -273.15 degrees Celcius (e.g., also absolute 0, or 0 degrees Kelvin) causing the denominator of the density ratio to become zero, and thus undefined, cannot occur as an “outside” air temperature as set forth in the claims. In view of the foregoing, Applicant respectfully requests that the rejection be reconsidered and withdrawn.

The rejection of Claim 35 and 91 under 35 USC 101 as lacking patentable utility is hereby traversed and reconsideration thereof is respectfully requested. Paragraph 7 of the Office Action states that when \tanh is zero, the sensitivity is ineffective. Applicant respectfully submits that Claims 35 and 91 do not recite “sensitivity” as a claim element. Sensitivity is recited as an element in connection with other claims, such as, for example, Claim 36. The values for \tanh , including when $\tanh=0$, used in connection with the elements recited in Claims 35 and 91 do not render Claims 35 and 91 as lacking patentable utility. In view of the foregoing, Applicant respectfully requests that the rejection be reconsidered and withdrawn.

The rejection of Claim 36 and 92 under 35 USC 101 as lacking patentable utility is hereby traversed and reconsideration thereof is respectfully requested. Applicant has amended Claims 36 and 92 herein in accordance with remarks set forth in the Office Action. Applicant

has amended \tanh and \cosh^{-2} to exclude values of zero. Applicant respectfully submits that the foregoing amendments to Claims 36 and 92 do not add new matter because one skilled in the art would interpret the equations as included in the specification to exclude such values based on well known rules and principles, such algebraic rules related to the values causing \cosh^{-2} to be undefined when \cosh^{-2} is zero. In view of the foregoing, Applicant respectfully requests that the rejection be reconsidered and withdrawn.

The rejection of Claim 35-36 and 91-92 under 35 USC 101 as lacking patentable utility due to the specification objections of the Office Action is hereby traversed and reconsideration thereof is respectfully requested. Applicant has amended the specification and Figure 12 to address objections to the specification. Thus, the rejections of Claims 35-36 and 91-92 having a basis related to the objections of the specification are also addressed and overcome. In view of the foregoing, Applicant respectfully requests that the rejection be reconsidered and withdrawn.

The rejection of Claims 37 and 93 under 35 U.S.C. 101 for performing a partial derivative on equations cited as nonfunctional is hereby traversed and reconsideration thereof is respectfully requested. Applicant has addressed this rejection in connection with previous rejections herein of Claims 35, 36, 91 and 92 with respect to the equations cited in the Office Action as being non-functional. In view of the foregoing, Applicant respectfully requests that the rejection be reconsidered and withdrawn.

The rejection of Claims 1-107 under 35 U.S.C. § 112, ¶1 is hereby traversed and reconsideration thereof is respectfully requested. The Office Action states that this rejection is made due to a previously cited rejection of Claims 1-107 under 35 U.S.C. 101. Applicant

respectfully submits that although Claims 16, 35-37, 72, 91-93, and 57-107 are rejected under 35 U.S.C. 101 in the Office Action, nowhere in the Office Action do the remaining claims appear to be rejected under 35 U.S.C. 101. Applicant respectfully submits that the rejection of Claims 16, 35-37, 72, 91-93, and 57-107 under 35 USC 112, first paragraph, based on the previous 101 rejection, has been addressed by the amendments and remarks made herein as set forth above in connection with the previous 101 rejections. Applicant respectfully submits that there appears to be no basis for the rejection of the remaining claims with respect to a previous 101 rejection.

In view of the foregoing, Applicant respectfully requests that the rejection be reconsidered and withdrawn.

The rejection of Claims 1, 11, 13, 17, 23, 25, 26, 28, 29, 31, 39, 40, 41, 52, 55, 56, 79, 81, 82, 84, 85, 95, 96, 101, 102 and 104 under 35 USC 112, second paragraph, as being indefinite is hereby traversed and reconsideration thereof is respectfully requested. Applicant has amended Claims 1, 39, 52, 55, 56, 57, 95 and 104 in accordance with remarks set forth in the Office Action regarding a flight regime. Applicant respectfully submits that the amendments with respect to the flight regime made to Claims 1, 39, 52, 55, 56, 57, 95 and 104 addresses the rejection with respect to Claims 1, 11, 13, 17, 23, 25, 26, 28, 29, 31, 39, 40, 41, 52, 55, 56, 79, 81, 82, 84, 85, 95, 96, 101, 102 and 104. In particular, the amendment to Claim 1 addresses the rejection set forth in paragraph 13 of the Office Action with respect to Claim 1 and Claims 11, 13, 17, 23, 25, 26, 29, and 31 that depend from Claim 1. The amendment made to Claim 39 addresses this rejection with respect to Claims 39-41. The amendment made to Claim 57 addresses this rejection with respect to Claims 57, 79, 81, 82, 84 and 85. The amendment made to Claim 95 addresses this rejection with respect to Claims 95, 96, 101 and 102.

In view of the foregoing, Applicant respectfully requests that the rejection be reconsidered and withdrawn.

The rejection of Claims 1-37 and 57-93 under 35 U.S.C. 102(b) as being anticipated by McCool et al. (U.S. Patent No. 5,987,397, hereinafter referred to as “McCool”) is hereby traversed and reconsideration thereof is respectfully requested. Applicant notes that the initial statement regarding this rejection on page 5, numbered paragraph 15, appears incomplete with respect to all the claims rejected based on McCool. In following portions of paragraph 15 on pages 5-13 of the Office Action, the Office Action additionally cites Claims 48-51 and 52-53, and 56 as rejected based on McCool. As such, Applicant will also address this rejection with respect to the additional Claims 48-51 and 52-53, and 56. Applicant also notes that the rejections set forth on pages 12-13 are interpreted as applying to McCool.

Claim 1, as amended herein, recites a method for determining a weight of an aircraft comprising: determining a flight regime in accordance with one or more inputs, said flight regime of the aircraft being associated with a flight state of the aircraft based on said one of more inputs; selecting a neural net in accordance with said flight regime; and determining said weight using said neural net. Claims 2-37 depend from Claim 1.

Claim 48, as amended herein, recites a system for determining a weight of an aircraft comprising: a regime recognizer that determines a regime indicator in accordance with a portion of said one or more inputs, said regime indicator indicating a flight regime associated with a

flight state of the aircraft based on said portion of the one or more inputs; and a gross weight estimator that determines said weight of said aircraft, said gross weight estimator including at least one of: a Kalman filter, and one or more neural nets, and using at least one of said Kalman filter and a first of said one or more neural nets in determining said weight. Claims 49-51 depend from Claim 48.

Claim 52, as amended herein, recites a method for determining an aircraft parameter comprising: determining a flight regime in accordance with one or more inputs, said flight regime of the aircraft being associated with a flight state of the aircraft based on said one of more inputs; selecting a neural net in accordance with said flight regime; and determining said aircraft parameter using said neural net. Claim 53 depends from Claim 52.

Claim 56, as amended herein, recites a system for determining an aircraft parameter comprising: a regime recognizer that determines a regime indicator in accordance with a portion of said one or more inputs, said regime indicator representing a flight regime of an aircraft being associated with a flight state of the aircraft based on said portion of the one of more inputs; and an aircraft parameter generator that determines said aircraft parameter, said aircraft parameter generator including at least one of: a Kalman filter, and one or more neural nets, and using at least one of said Kalman filter and a first of said one or more neural nets in determining said aircraft parameter.

Claim 57, as amended herein, recites a computer readable medium comprising code stored thereon for determining a weight of an aircraft, the computer readable medium

comprising code that: determines a flight regime in accordance with one or more inputs, said flight regime of the aircraft being associated with a flight state of the aircraft based on said one of more inputs; selects a neural net in accordance with said flight regime; and determines said weight using said neural net. Claims 58-93 depend from Claim 57.

McCool discloses use of a neural network for estimating the helicopter gross weight and center of gravity location. (See title, abstract generally). McCool discloses that information on gross weight and center of gravity location in a helicopter is estimated in a real time fashion by a neural network system which includes means for defining input signals derived from a plurality of variable parameters that are recorded during flight of the helicopter based on measurements in a non-rotating reference frame associated with the helicopter. Previously recorded test flight data in terms of variable input parameters and coinciding reference data on gross weight and center of gravity location are used to establish a learned relationship between such input parameters and the coinciding reference data. Memory means is provided for storing the learned relationship as a nonlinear algorithm on board the helicopter for use in a signal processor, receiving real time values of the input parameters and in accordance with said algorithm determine and display estimates of the gross weight and center of gravity locations under flight conditions. (Col. 1, Lines 35-52).

Claim 1, as amended herein, is neither disclosed nor suggested by McCool in that McCool neither discloses nor suggests ***a method for determining a weight of an aircraft comprising: determining a flight regime in accordance with one or more inputs, said flight regime of the aircraft being associated with a flight state of the aircraft based on said one of***

more inputs; selecting a neural net in accordance with said flight regime; and determining said weight using said neural net, as set forth in Claim 1.

As support for each of the foregoing recited steps of Claim 1, the Office Action at page 5 relies on Col. 1, Lines 35-52 of McCool. This citation of McCool is pointed out above.

Applicant respectfully submits that this citation of McCool appears silent regarding determining a flight regime associated with the flight state of the aircraft based on one or more inputs.

Furthermore, this citation of McCool is also silent with respect to selecting a neural net based on the flight regime and using this neural net to determine the weight of the aircraft.

McCool discloses operating his system 10 during a first hover maneuver or hover flight conditions and making an initial estimate regarding the gross weight and center of gravity. (See, for example, Col. 2, Lines 53-66; step 40 of Figure 2; Col. 3, Lines 30-33). The initial calculations regarding gross weight and center of gravity are updated using the fuel information to determine the desired real-time gross weight and center of gravity location output. (See Figure 4, step 44, Col. 3, Lines 35-37). Applicant notes that McCool does not disclose how a determination is made as to when the helicopter is in a first hover maneuver or hover flight condition and therefore neither discloses nor suggests Applicant's determining step of amended Claim 1. McCool also makes no disclosure or suggestion of selecting a neural net in accordance with a flight regime. McCool teaches a methodology in which the neural net is only trained in hover flight conditions. Accordingly, McCool cannot possibly teach or disclose selecting a neural net in accordance with a flight regime when McCool's neural net is only operative under hover flight conditions. Furthermore, as set forth in the processing step of Figure 2, there is no

selection step for selecting a neural network in accordance with a flight regime. Therefore, McCool neither discloses nor suggests Applicant's selecting step as recited in amended Claim 1.

For at least these reasons, Applicant's Claim 1 is neither disclosed nor suggested by McCool.

Claims 2-37 which depend from Claim 1 are patentable over McCool for at least the same reasons Claim 1. However, Applicant will point out additional features set forth in some of Claims 2-37 which are also neither disclosed nor suggested by McCool. It should be noted that Applicant will not attempt to address each and every dependent Claim 2-37. Rather, following paragraphs address only some of these dependent claims. Failure to specifically address a particular dependent claim or feature therein should not be construed as an indication that McCool discloses anything with respect to the particular dependent claim or feature therein.

Claim 4 recites, in part, *wherein said neural net is one of a plurality of neural nets*. As support for disclosing the foregoing feature of Claim 4, the Office Action at page 6 relies on Col. 1, Lines 35-52 of McCool. Applicant cannot find where in this citation of McCool there is any mention to a plurality of neural nets from which one is selected based on the flight regime.

Claim 5 recites, in part, *wherein said neural net is a feedforward neural net*. As support for disclosing the foregoing feature of Claim 5, the Office Action at page 6 relies on Col. 1, Lines 35-52 of McCool. Applicant cannot find where in this citation of McCool there is any

mention to a particular type of neural net. If there is a reliance on the feature being inherent within McCool, there must be more than a mere possibility or probability that such a neural network type is used. Based on the teachings in McCool, any one of a variety of different types of neural networks may be used and there is no further teaching in McCool to lead one skilled in the art to conclude that a feedforward neural net was used rather than other possible neural networks.

Claim 6 recites, in part, *wherein said neural net includes a single hidden layer*.

As support for disclosing the foregoing feature, the Office Action at page 6 relies on McCool at Col. 3, Lines 8-40. Applicant respectfully submits that there is no mention in McCool regarding any number of hidden layers let alone a single hidden layer as recited in Claim 6. Once again, if the Office Action is relying on inherency as a basis for this rejection, there must be more than a possibility that a single layer is used. Applicant can find no disclosure, suggestion or other basis for concluding that McCool uses a single hidden layer or any particular number of layers.

Regarding the features recited in dependent Claims 7, 8, and 9, recite specific features regarding the neural net. The Office Action at pages 6-7 relies on McCool at Col. 3, Lines 8-40 for disclosing Claims 7 and 8, and Col. 2, lines 32-67 for disclosing Claim 9. Applicant cannot locate where in the foregoing sections of McCool there is any reference to the specific features regarding the interconnections (e.g., Claim 7), the particular activation function used (e.g., Claim 8) or the number of neurons (e.g., Claim 9).

With respect to Claim 16, Applicant could find no citation of McCool set forth in the Office Action regarding where McCool discloses the features of Claim 16.

With respect to the features recited in Claims 24, 27 and 30, the Office Action at pages 9-10 relies on McCool at Col. 2, Lines 32-67, Col. 3, Lines 1-7 and Figures 1 and 2 for disclosing the recited features therein. Applicant respectfully submits that Claims 24, 27 and 30 recite specific ranges and values which are neither disclosed nor suggested in the foregoing citations or elsewhere within McCool.

Applicant's Claims 52 and 57 recite features similar to those set forth in Claim 1. Thus, Claims 52 and 57 are also neither disclosed nor suggested by McCool for reasons similar to those set forth regarding Claim 1.

Applicant's Claim 48 is neither disclosed nor suggested by McCool in that McCool neither discloses nor suggests at least the features of *a system for determining a weight of an aircraft comprising: a regime recognizer that determines a regime indicator in accordance with a portion of said one or more inputs, said regime indicator indicating a flight regime associated with a flight state of the aircraft based on said portion of the one or more inputs, ...* as set forth in Claim 48. The Office Action at page 12 cites to McCool at Col. 2, Lines 32-67 for disclosing the foregoing features of Claim 48. As set forth above, McCool's processing takes place when the helicopter is hovering. However, McCool is silent regarding how a

determination is made regarding when the helicopter is hovering. McCool does not disclose or suggest any means to determine an active regime.

Claim 56 recites features similar to those set forth above in Claim 48. Thus, Claim 56 is neither disclosed nor suggested by McCool for reasons similar to those set forth regarding Claim 48.

In view of the foregoing, Applicant respectfully requests that the rejection be reconsidered and withdrawn.

The rejection of Claims 38-56 under 35 U.S.C. 102(b) as being anticipated by Smith et al. (U.S. Patent No. 5,606,505, hereinafter referred to as “Smith”) is hereby traversed and reconsideration thereof is respectfully requested. Applicant notes that the initial statement regarding this rejection on page 13, numbered paragraph 17, appears incomplete with respect to all the claims rejected based on Smith. The initial statement indicates that Claims 38-56 are rejected based on Smith. However, in following portions of paragraph 17 on pages 13-15 of the Office Action, the Office Action sets forth rejections regarding Claims 38-47, 54-55, and 94-103. As such, Applicant will address this rejection with respect to the Claims 38-47, 54-55, and 94-103.

Claim 38, as amended herein, recites a method of determining a weight of an aircraft comprising: receiving one or more values; and determining said weight using a Kalman filter

wherein said one or more values are used as inputs to said Kalman filter and said Kalman filter produces the weight as an output. Claims 39-47 depend from Claim 38.

Claim 54, as amended herein, recites a method of determining one or more aircraft parameters comprising: receiving one or more values; and determining said one or more aircraft parameters using a Kalman filter wherein said one or more values are used as inputs to said Kalman filter, said one or more aircraft parameters including a weight of an aircraft, the weight being produced as an output of the Kalman filter. Claim 55 depends from Claim 54.

Claim 94, as amended herein, recites a computer readable medium comprising code stored thereon that determines a weight of an aircraft, the computer readable medium comprising code that: receives one or more values; and determines said weight using a Kalman filter wherein said one or more values are used as inputs to said Kalman filter and said Kalman filter produces the weight as an output. Claims 95-103 depend from Claim 94.

Smith relates to flight management systems. In particular, Smith pertains to estimating and predicting aircraft performance. (Col. 1, Lines 9-12). Smith discloses a system including a learning portion 12 and a predicting portion 14. The portion 12 includes signal conditioning 15 and performance estimation 16. The learning portion 12 includes modeling a thrust minus drag relationship of an aircraft utilizing signal input parameters 26, such as current aircraft weight and altitude, and aircraft specific data. Signal conditioning includes as an output 28 a gross weight estimate (Figure 1, Col. 3, Lines 33-40; Col. 8, Lines 22-28). Figure 2 details signal conditioning 15 and includes generating the gross weight estimate as an output of integrator 34. Figure 2 also includes an altitude rate filter 40 and acceleration rate filter 42 disclosed as being

Kalman filters. (Figure 2; Col. 7, Lines 11-16). Figure 3 includes 2 Kalman filters to learn the coefficients of the Taylor series expansion modeling thrust minus drag and rated fuel flow.

Figure 3 includes performance Kalman filter 48 and fuel flow rating Kalman filter 52.

Claim 38, as amended herein, is neither disclosed nor suggested by Smith in that Smith neither discloses nor suggests at least the features of *a method of determining a weight of an aircraft comprising:... determining said weight using a Kalman filter wherein said one or more values are used as inputs to said Kalman filter and said Kalman filter produces the weight as an output*, as set forth in Claim 38. As pointed out above, Smith discloses use of Kalman filters in connection with his Figures 2 and 3. Smith discloses use of Kalman filters in connection with element numbers 40 and 42 of Figure 2, and element numbers 48 and 52 of Figure 3. However, Smith appears to neither disclose nor suggest producing the weight of the aircraft as an output of any one of the foregoing Kalman filters. Accordingly, Smith does not disclose or suggest the foregoing recited features of Claim 38.

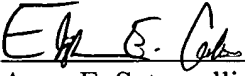
For at least the foregoing reasons, Claim 38 is neither disclosed nor suggested by Smith.

Claims 54 and 94 recite features similar to those set forth in connection with Claim 38. Thus, Claims 54 and 94 are neither disclosed nor suggested by Smith for reasons similar to those set forth regarding Claim 38.

In view of the foregoing, Applicant respectfully requests that the rejection be reconsidered and withdrawn.

Based on the above, Applicant respectfully requests that the Examiner reconsider and withdraw all outstanding rejections and objections. Favorable consideration and allowance are earnestly solicited. Should there be any questions after reviewing this paper, the Examiner is invited to contact the undersigned at 508-898-8604.

Respectfully submitted,
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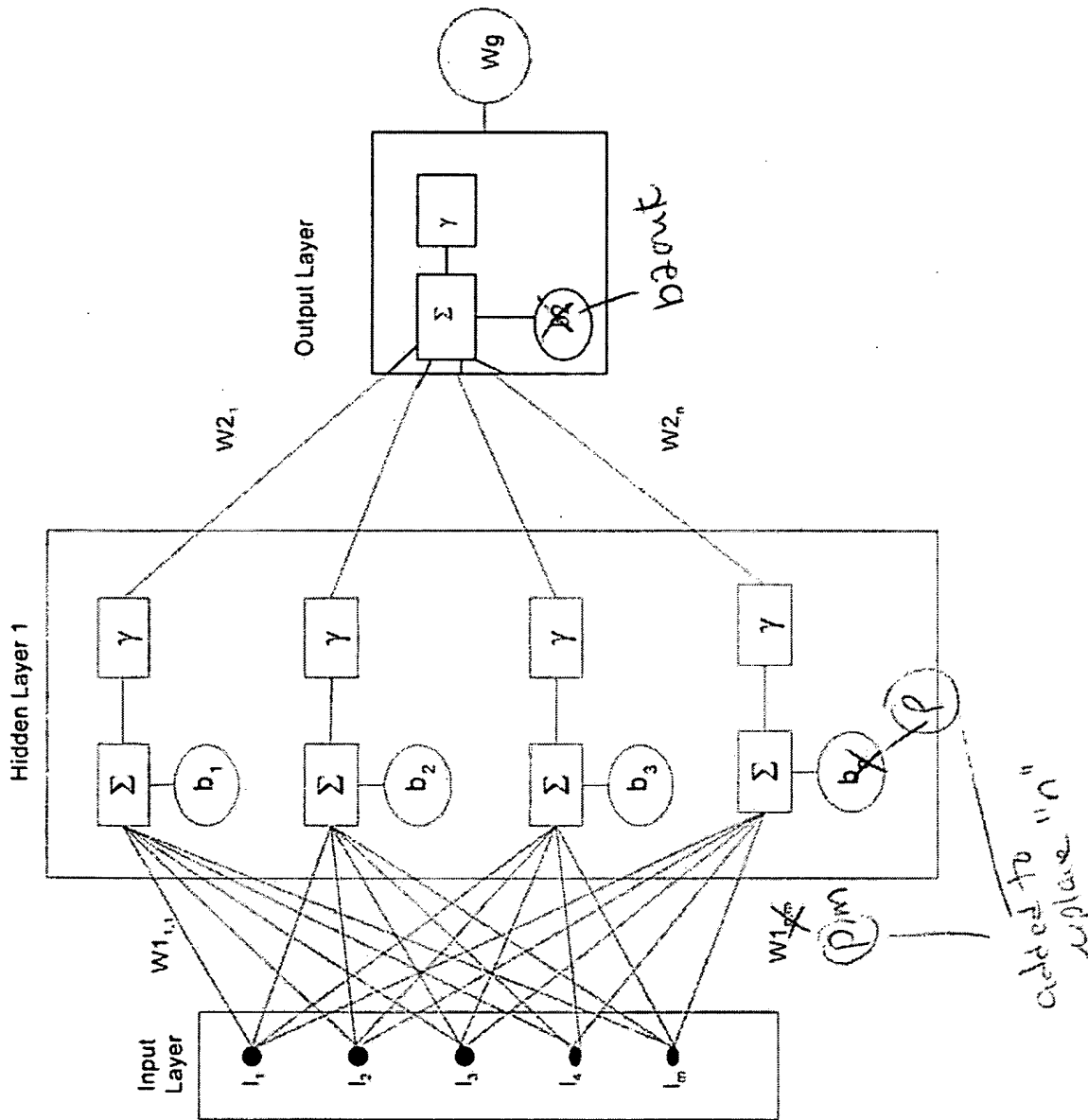


FIGURE 12